AMENDMENT UNDER 37 C.F.R. § 1.111   **PATENT APPLICATION**
U.S. Application No.: 10/024,215   Atty. Docket No.: Q67860

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the

application:

LISTING OF CLAIMS:

1.   (Original)   A moving picture encoding system for encoding moving picture

sequences with respect to each object, comprising:

a coding means for encoding object picture data consisting of time series sequences of

video object planes (VOPs), each of which is a picture image of the object at a point of time, and

shape information data indicating the shape of the object in each VOP while conducting bit rate

control so that the number of generated bits for each VOP meets a target bit number, and

outputting coding information including a quantization parameter used in encoding and the

generated bit number along with obtained bit streams;

an area calculating means for calculating the area of the object in each VOP based on the

shape information data, and outputting the result as area data;

a predictive area calculating parameter extracting means for obtaining a function that

indicates temporal variations in the area of the object based on the history of the area data, and

outputting a parameter specifying the function or a predictive value of the area obtained by the

function as a predictive area calculating parameter;

a bit number model parameter calculating means for calculating a parameter used in

modeling the generated bit number per unit area of the object based on the coding information,

the generated bit number and the area data, and outputting the result as a bit number model

parameter;

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a predictive bit number calculating parameter extracting means for obtaining a function that indicates temporal variations in the bit number model parameter based on the history of the bit number model parameter, and outputting a parameter specifying the function or a predictive value of the bit number model parameter obtained by the function as a predictive bit number calculating parameter; and

a target bit number calculating means which performs a series of processes: calculating an uncoded VOP allocatable bit number that is the total number of allocatable bits for uncoded VOPs in a certain period of time based on allocatable bit number information indicating the total number of allocatable bits for the VOPs in the certain period of time and the number of generated bits for the encoded VOPs in the certain period of time, estimating the number of generated bits for the uncoded VOPs based on the predictive area calculating parameter and the predictive bit number calculating parameter, allocating the uncoded VOP allocatable bit number, calculating a target bit number for the next VOP to be encoded, and outputting the target bit number; sequentially for each of VOPs in the certain period of time.

2.   (Original)   A moving picture encoding system for encoding moving picture sequences with respect to each object, comprising:

a storing means for temporarily storing object picture data consisting of time series sequences of video object planes (VOPs), each of which is a picture image of the object at a point of time, and shape information data indicating the shape of the object in each VOP;

a coding means which reads the object picture data and shape information data out of the storing means, encodes the data while conducting bit rate control so that the number of generated bits for each VOP meets a target bit number, and outputs coding information including a

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quantization parameter used in encoding and the generated bit number along with obtained bit streams;

an area calculating means for calculating the area of the object in each VOP based on the shape information data, and outputting the result as area data;

a bit number model parameter calculating means for calculating a parameter used in modeling the generated bit number per unit area of the object based on the coding information, the generated bit number and the area data, and outputting the result as a bit number model parameter;

a predictive bit number calculating parameter extracting means for obtaining a function that indicates temporal variations in the bit number model parameter based on the history of the bit number model parameter, and outputting a parameter specifying the function or a predictive value of the bit number model parameter obtained by the function as a predictive bit number calculating parameter; and

a target bit number calculating means which performs a series of processes: calculating an uncoded VOP allocatable bit number that is the total number of allocatable bits for uncoded VOPs in a certain period of time based on allocatable bit number information indicating the total number of allocatable bits for the VOPs in the certain period of time and the number of generated bits for the encoded VOPs in the certain period of time, estimating the number of generated bits for the uncoded VOPs based on the area data and the predictive bit number calculating parameter, allocating the uncoded VOP allocatable bit number, calculating a target bit number for the next VOP to be encoded, and outputting the target bit number; sequentially for each of VOPs in the certain period of time.

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3. (Currently Amended) The moving picture encoding system claimed in claim 1,

wherein a moving picture sequence ~~may includes~~ comprises a plurality of objects.

4. (Currently Amended) The moving picture encoding system claimed in claim 2,

wherein a moving picture sequence ~~may includes~~ comprises a plurality of objects.

5. (Original) A moving picture encoding system for encoding each frame of

moving picture sequences while conducting bit rate control with respect to each section of the

frame, comprising:

a coding means which is supplied with picture data, section information data indicating

the sections in each frame of the picture data and a target bit number for each section, encodes

the data with respect to each section while conducting bit rate control so that the number of

generated bits for each section meets the target bit number, and outputs coding information

including a quantization parameter used in encoding and the generated bit number along with

obtained bit streams;

an area calculating means for calculating the area of the section in each frame based on

the section information data, and outputting the result as area data;

a predictive area calculating parameter extracting means for obtaining a function that

indicates temporal variations in the area of the section based on the history of the area data, and

outputting a parameter specifying the function or a predictive value of the area obtained by the

function as a predictive area calculating parameter;

a bit number model parameter calculating means for calculating a parameter used in

modeling the generated bit number per unit area of the section based on the coding information,

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the generated bit number and the area data, and outputting the result as a bit number model

parameter;

a predictive bit number calculating parameter extracting means for obtaining a function

that indicates temporal variations in the bit number model parameter based on the history of the

bit number model parameter, and outputting a parameter specifying the function or a predictive

value of the bit number model parameter obtained by the function as a predictive bit number

calculating parameter; and

a target bit number calculating means which performs a series of processes: calculating

an uncoded frame allocatable bit number that is the total number of allocatable bits for uncoded

frames in a certain period of time based on allocatable bit number information indicating the

total number of allocatable bits for the frames in the certain period of time and the number of

generated bits for the encoded frames in the certain period of time, estimating the number of

generated bits for each section in the uncoded frames based on the predictive area calculating

parameter and the predictive bit number calculating parameter, allocating the uncoded frame

allocatable bit number, calculating a target bit number for each section in the next frame to be

encoded, and outputting the target bit number; sequentially for each of frames in the certain

period of time.

6.   (Original)   A moving picture encoding system for encoding each frame of

moving picture sequences while conducting bit rate control with respect to each section of the

frame, comprising:

a storing means for temporarily storing picture data, section information data indicating

the sections in each frame of the picture data;

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a coding means which reads the picture data and section information data out of the storing means, encodes the data with respect to each section while conducting bit rate control so that the number of generated bits for each section meets a target bit number for the section, and outputs coding information including a quantization parameter used in encoding and the generated bit number along with obtained bit streams;

an area calculating means for calculating the area of the section in each frame based on the section information data, and outputting the result as area data;

a bit number model parameter calculating means for calculating a parameter used in modeling the generated bit number per unit area of the section based on the coding information, the generated bit number and the area data, and outputting the result as a bit number model parameter;

a predictive bit number calculating parameter extracting means for obtaining a function that indicates temporal variations in the bit number model parameter based on the history of the bit number model parameter, and outputting a parameter specifying the function or a predictive value of the bit number model parameter obtained by the function as a predictive bit number calculating parameter; and

a target bit number calculating means which performs a series of processes: calculating an uncoded frame allocatable bit number that is the total number of allocatable bits for uncoded frames in a certain period of time based on allocatable bit number information indicating the total number of allocatable bits for the frames in the certain period of time and the number of generated bits for the encoded frames in the certain period of time, estimating the number of generated bits for each section in the uncoded frames based on the area data and the predictive

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bit number calculating parameter, allocating the uncoded frame allocatable bit number,

calculating a target bit number for each section in the next frame to be encoded, and outputting

the target bit number; sequentially for each of frames in the certain period of time.

     7.   (Original)   The moving picture encoding system claimed in claim 1, wherein:

the bit number model parameter is a complexity index per unit area of the picture; and

the target bit number calculating means calculates the target bit number based on a

product of a predictive value of the complexity index and a predictive value of the area data.

     8.   (Original)   The moving picture encoding system claimed in claim 5, wherein:

the bit number model parameter is a complexity index per unit area of the picture; and

the target bit number calculating means calculates the target bit number based on a

product of a predictive value of the complexity index and a predictive value of the area data.

     9.   (Original)   The moving picture encoding system claimed in claim 2, wherein:

the bit number model parameter is a complexity index per unit area of the picture; and

the target bit number calculating means calculates the target bit number based on a

product of a predictive value of the complexity index and the area data.

     10.   (Original)   The moving picture encoding system claimed in claim 6, wherein:

the bit number model parameter is a complexity index per unit area of the picture; and

the target bit number calculating means calculates the target bit number based on a

product of a predictive value of the complexity index and the area data.

     11.   (Original)   The moving picture encoding system claimed in claim 1, wherein:

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the bit number model parameter calculating means calculates the bit number model

parameter with respect to each VOP type; and

the predictive bit number calculating parameter extracting means calculates the predictive

bit number calculating parameter with respect to each VOP type.

12.   (Original)   The moving picture encoding system claimed in claim 2, wherein:

the bit number model parameter calculating means calculates the bit number model

parameter with respect to each VOP type; and

the predictive bit number calculating parameter extracting means calculates the predictive

bit number calculating parameter with respect to each VOP type.

13.   (Original)   The moving picture encoding system claimed in claim 5, wherein:

the bit number model parameter calculating means calculates the bit number model

parameter with respect to each frame type; and

the predictive bit number calculating parameter extracting means calculates the predictive

bit number calculating parameter with respect to each frame type.

14.   (Original)   The moving picture encoding system claimed in claim 6, wherein:

the bit number model parameter calculating means calculates the bit number model

parameter with respect to each frame type; and

the predictive bit number calculating parameter extracting means calculates the predictive

bit number calculating parameter with respect to each frame type.

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15.   (Original)   The moving picture encoding system claimed in claim 3, wherein a

constant which can make a variation in quantization fineness among objects is used when the

target bit number is calculated.

16.   (Original)   The moving picture encoding system claimed in claim 4, wherein a

constant which can make a variation in quantization fineness among objects is used when the

target bit number is calculated.

17.   (Original)   The moving picture encoding system claimed in claim 5, wherein a

constant which can make a variation in quantization fineness among sections is used when the

target bit number is calculated.

18.   (Original)   The moving picture encoding system claimed in claim 6, wherein a

constant which can make a variation in quantization fineness among sections is used when the

target bit number is calculated.

19.   (Original)   A moving picture encoding method for encoding moving picture

sequences with respect to each object, comprising the steps of:

calculating an uncoded VOP allocatable bit number that is the total number of allocatable

bits for uncoded VOPs in a certain period of time by subtracting the number of generated bits for

the encoded VOPs in the certain period of time from the total number of allocatable bits for the

VOPs in the certain period of time;

estimating the number of generated bits for all the uncoded VOPs;

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· calculating a target bit number for the next VOP to be encoded by allocating the uncoded

VOP allocatable bit number; and

encoding the VOP; sequentially for each of VOPs in the certain period of time.

20.   (Original)   A moving picture encoding method for encoding each frame of

moving picture sequences while conducting bit rate control with respect to each section of the

frame, comprising the steps of:

calculating an uncoded frame allocatable bit number that is the total number of

allocatable bits for uncoded frames in a certain period of time by subtracting the number of

generated bits for the encoded frames in the certain period of time from the total number of

allocatable bits for the frames in the certain period of time;

estimating the number of generated bits for all the sections in the uncoded frames;

calculating a target bit number for each section in the next frame to be encoded by

allocating the uncoded frame allocatable bit number; and

encoding the frame; sequentially for each of frames in the certain period of time.

21.   (Original)   The moving picture encoding method claimed in claim 19, wherein

a constant which can make a variation in quantization fineness among objects is used when the

target bit number is calculated.

22.   (Original)   The moving picture encoding method claimed in claim 20, wherein

a constant which can make a variation in quantization fineness among sections is used when the

target bit number is calculated.

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23.   (Original)   A program for conducting a computer to execute the moving picture encoding method claimed in claim 19.

24.   (Original)   A program for conducting a computer to execute the moving picture encoding method claimed in claim 20.

25.   (New)   A moving picture object coding method comprising the steps of:

computing the area of an object based on the shape information of said object;

predicting a bit number to be generated based on a change of said area over time; and

encoding the object using said predicted bit number.

26.   (New)   The moving picture object coding method as claimed in claim 25, wherein

said predicted bit number is prepared for a plurality of frames; and

the allocation of bit numbers of every frame that are allocable to said plurality of frames

is decided based on said predicted bit number.

27.   (New)   The moving picture object coding method as claimed in claim 25, wherein

said predicted bit number is prepared for a plurality of objects; and

the allocation of bit numbers to every object that are allocable to said plural of objects is

decided based on said predicted bit number.

28.   (New)   The moving picture object coding method as claimed in claim 25, wherein

said change of said area over time is predicted.

29.   (New)   A moving picture object coding apparatus comprising:

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means for computing the area of an object based on shape information of said object;

means for predicting a bit number to be generated based on a change of said area over time; and

means for encoding said object using said predicted bit number.

30.   (New) The moving picture object coding apparatus as claimed in claim 29, wherein

in computing said area of said object, said predicted bit number is prepared for a plurality of frames; and

allocation of bit numbers to every frame that are allocable to said plurality of objects is decided based on said predicted bit number.

31.   (New) The moving picture object coding apparatus as claimed in claim 29, wherein

in computing said area of said object, said predicted bit number is prepared for a plurality of objects; and

allocation of bit numbers to every object that are allocable to said plurality of objects is decided based on said predicted bit number.

32.   (New) The moving picture object apparatus as claimed in claim 29, wherein said change of said area over time is predicted.